PUMA VTS series
PUMA VTS1214 / 1620

Large Vertical Turning Center with RAM Head Spindle

Doosan Machine Tools

Optimal Solutions for the Future
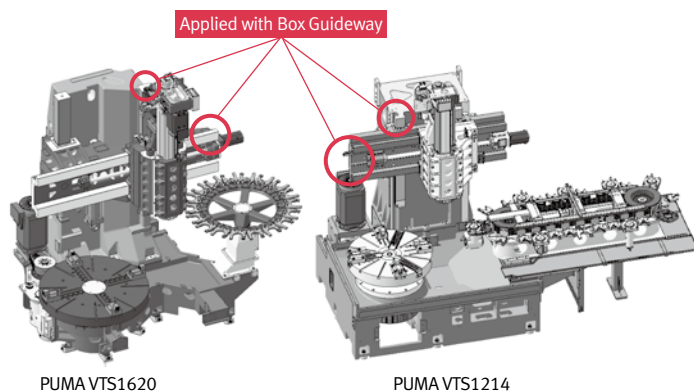
PUMA VTS series
PUMA VTS1214 / 1620

With its large capacity and heavy duty machining capability,
The PUMA VTS series provides excellent productivity for large workpieces

Features

1 Robust Structure

The PUMA VTS series provides optimum durability by including box guideway construction to all linear axes. The large diameter cross taper roller bearing used in the spindle construction provides high rigidity and accuracy for heavy duty machining applications
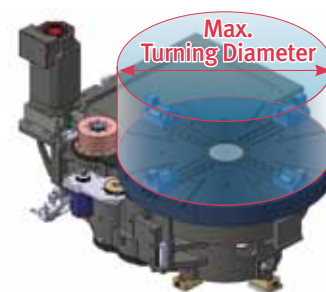
Applied with Box Guideway

Large Cross Taper Roller Bearings

PUMA VTS1620   PUMA VTS1214   PUMA VTS1620

2 Highest Cutting Capacity among Competitors

Provides maximum workpiece size capacity

Max. Turning diameter

PUMA VTS1620

Ø 2000 mm
(78.7 inch)

PUMA VTS1214

Ø 1350 mm
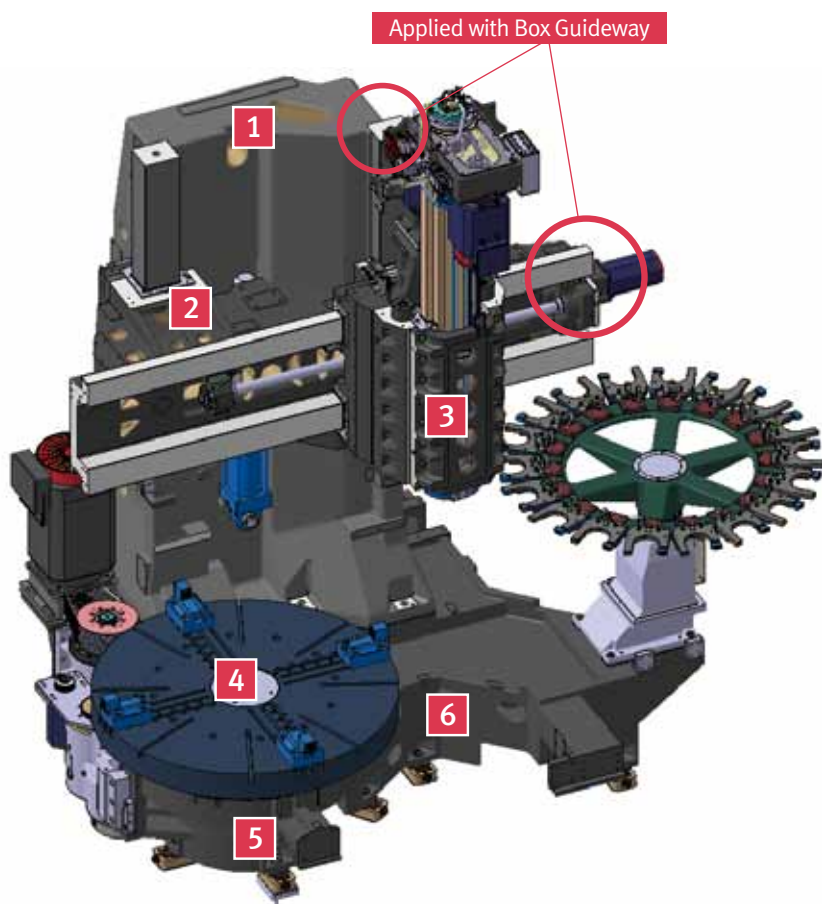(53.1 inch)

Max. Turning Diameter

Robust Mechanical Construction

PUMA VTS1620 series

The PUMA VTS1620M series provides extended durability and stable accuracy by implementing a large diameter cross roller bearing for the spindle and box guideways for the linear axes.
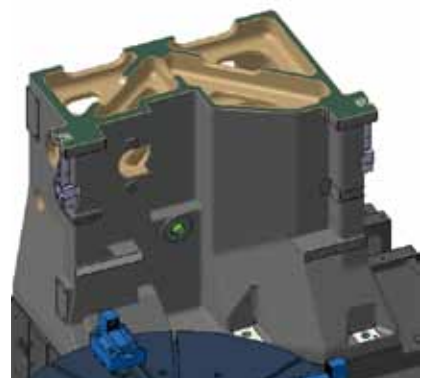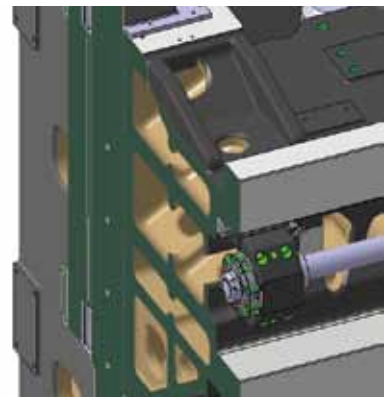
Machine Construction

Applied with Box Guideway

Model : PUMA VTS1620 Core Machine

1

A highly rigid X-type cast Meehanite column structure reduces deflection and ensures optimum cutting performance.

2

Deflection is avoided by the high rigidity crossrail and ram carriage construction.
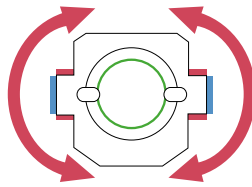
3

Large square cross-section

308 × 250 mm
(12.1 × 9.8 inch)

Wide ram guide for high torque

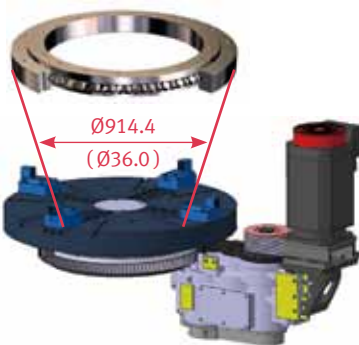1000 mm (39.4 inch) extra long guide span

Ram deformation minimized by enlarged guideway design enabling heavy duty cutting.

5

Applied with powerful helical gears to guarantee a long life. The VTS1620M is applied with a zero backlash system to realize accurate C axis control.

4

Ø914.4
(Ø36.0)

Designed with large diameter cross taper roller bearing featuring high rigidity in both radial and axial directions. The gears are capable of transmitting high cutting forces.

6

Designed in a base structure that provides a stable cutting performance to the table and carriage, using an X rib structure Meehanite casting.

Max. Table motor
45 { 60 } kW
(60.3 { 80.5 } Hp)

Max. Table torque
19875 { 24380 } N·m
(14667.8 { 17992.4 } ft·lb)

Max. Table speed
250 r/min

{ } : Option

Large Workpiece Capacity and Processing Capability

Crossrail Fixed Positions

The 4 position step block is provided to fix the W axis position of the crossrail, and in combination with a positioning pin, maintains a high level of positioning control.
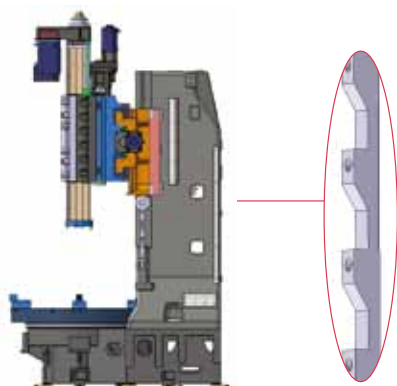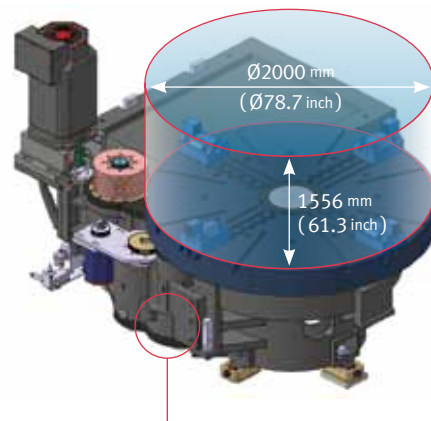
Crossrail fixed positions

4 steps = **770** mm
(30.3 inch)
(actuated by hydraulic cylinder)

Axis Travel

Ø2000 mm
(Ø78.7 inch)

1556 mm
(61.3 inch)

The built in 2-step gearbox provides a stable high torque drive

Max. Turning diameter	**Ø2000** mm (78.7 inch)	Z-axis	**960** mm (37.8 inch)
Max. Turning height	**1556** mm (61.3 inch)	W-axis	**770** mm (30.3 inch)
Max. Allowable load	**10000** kg (22045.9 lb)	X-axis	**1727** mm (68.0 inch)

ATC Magazine

Driving system	**Servo motor**
No. of tool stations	**18** { 24 } stations
Max. Tool length in Z-axis	**450** mm (17.7 inch) (Static tool)
	350 mm (13.8 inch) (BT50 / DIN 50 rotating tool)
Max. Tool weight	**50** Kg (110.2 lb) / tool

{ } : Option

C-axis Table
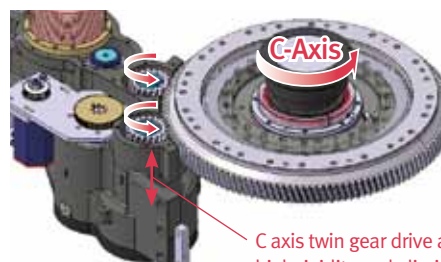
C-Axis

C axis twin gear drive achieves high rigidity and eliminates backlash

C-Axis Servo Motor VTS 1620 (M)

Max. Power and torque	**4** kW (5.4 Hp) **26400** N·m (19483.2 ft·lb)
C-axis feedrate	**900** deg/min (travel 360˚, 0.001˚ control)

Servo controlled c-axis table enables milling, drilling and tapping with excellent rotational accuracy and user satisfaction.
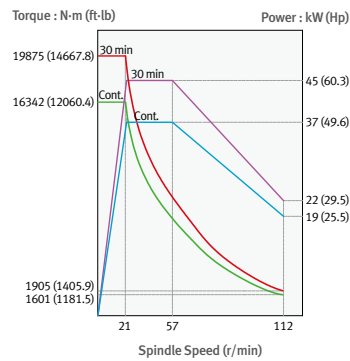
Table Motor Power - Torque

Max. Table motor & torque
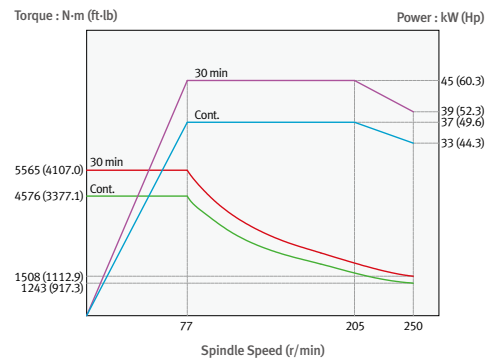
45 kW **19875** N·m
(60.3 Hp) (14667.8 ft·lb)

Max. Table motor & torque opt.
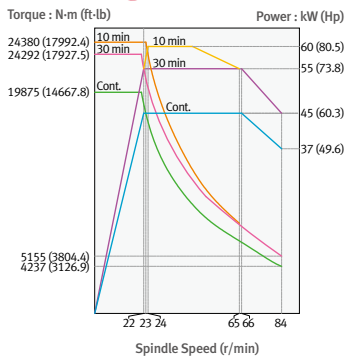
60 kW **24380** N·m
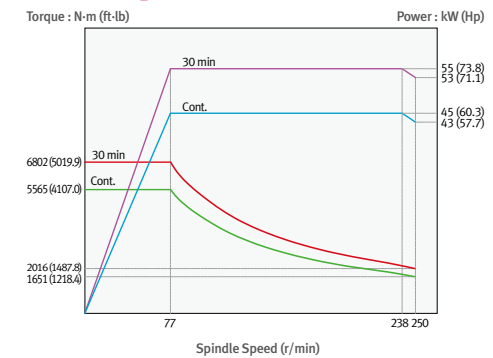(80.5 Hp) (17992.4 ft·lb)

Low Gear

Torque : N·m (ft·lb)   Power : kW (Hp)

19875 (14667.8) 30 min
16342 (12060.4) Cont.
Cont.
45 (60.3)
37 (49.6)
22 (29.5)
19 (25.5)
1905 (1405.9)
1601 (1181.5)
21 57 112
Spindle Speed (r/min)

High Gear

Torque : N·m (ft·lb)   Power : kW (Hp)

30 min
Cont.
45 (60.3)
39 (52.3)
37 (49.6)
33 (44.3)
5565 (4107.0) 30 min
4576 (3377.1) Cont.
1508 (1112.9)
1243 (917.3)
77 205 250
Spindle Speed (r/min)

Low Gear opt.

Torque : N·m (ft·lb)   Power : kW (Hp)

24380 (17992.4) 10 min
24292 (17927.5) 30 min 10 min
30 min
19875 (14667.8) Cont.
Cont.
60 (80.5)
55 (73.8)
45 (60.3)
37 (49.6)
5155 (3804.4)
4237 (3126.9)
22 23 24 65 66 84
Spindle Speed (r/min)

High Gear opt.

Torque : N·m (ft·lb)   Power : kW (Hp)

30 min
Cont.
55 (73.8)
53 (71.1)
45 (60.3)
43 (57.7)
6802 (5019.9) 30 min
5565 (4107.0) Cont.
2016 (1487.8)
1651 (1218.4)
77 238 250
Spindle Speed (r/min)

Ram Rotary Spindle

(common for PUMA VTS1214M / VTS1620M)

Max. Rotary tool power
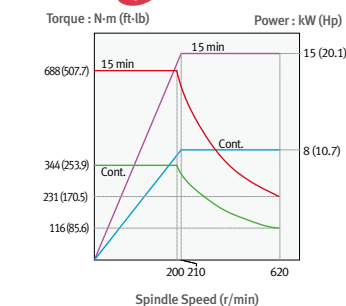
18.5 kW   **15** kW opt.
(24.8 Hp)   (20.1 Hp)

Torque : N·m (ft·lb)   Power : kW (Hp)

262 (193.4) 30 min
212 (156.5) Cont.
30 min
Cont.
19 (25.5)
16 (21.5)
15 (20.1)
12 (16.1)
51 (37.6)
39 (28.8)
655 675 2705 2750 3000
Spindle Speed (r/min)

Max. Rotary tool torque

262 N·m   **687** N·m opt.
(193.4 ft·lb)   (507.0 ft·lb)

Low Gear opt.

Torque : N·m (ft·lb)   Power : kW (Hp)

15 min
688 (507.7) 15 min
15 (20.1)
Cont.
8 (10.7)
344 (253.9) Cont.
231 (170.5)
116 (85.6)
200 210 620
Spindle Speed (r/min)

High Gear opt.

Torque : N·m (ft·lb)   Power : kW (Hp)

30 min
Cont.
15 (20.1)
11 (14.8)
458 (338.0) 30 min
336 (248.0) Cont.
70 (51.7)
53 (39.1)
300 310 2000
Spindle Speed (r/min)

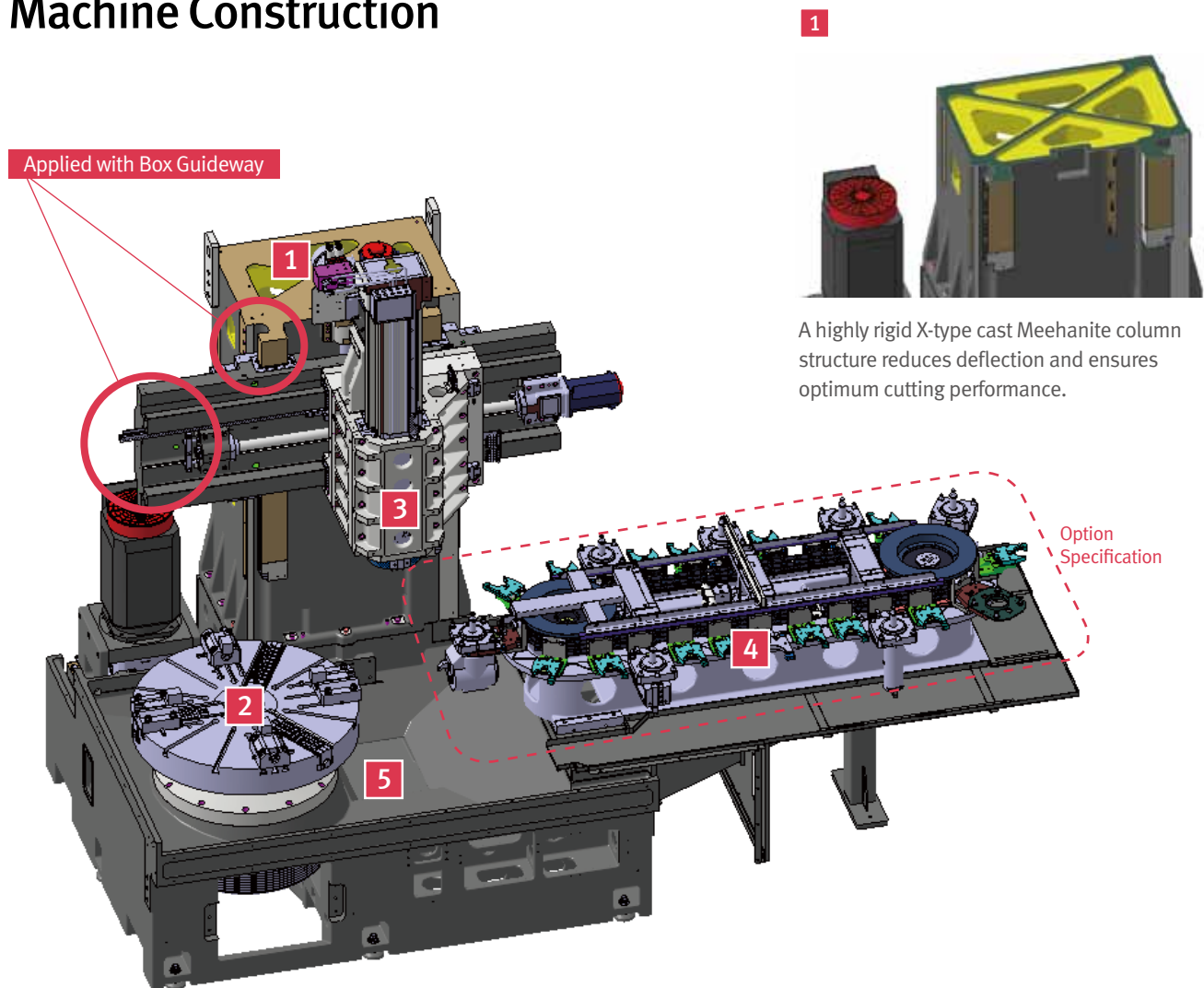**Max. Rotary tool speed** opt.

3000 r/min   **2000** r/min
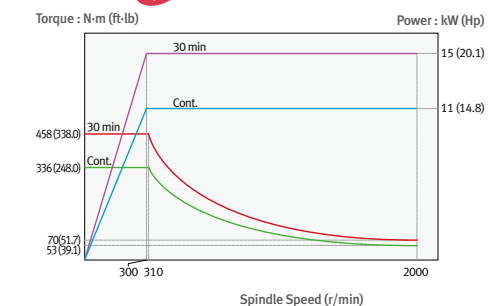
Robust Mechanical Construction   PUMA VTS1214 series

The PUMA VTS1214 series has minimized heat and vibration emissions using a separable-type gearbox, and it exhibits a high rigidity in heavy duty cutting using large bearings.

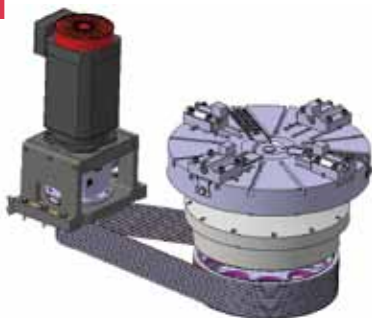PUMA VTS1214 series

Machine Construction

1

A highly rigid X-type cast Meehanite column structure reduces deflection and ensures optimum cutting performance.

Applied with Box Guideway

Option Specification

Model : PUMA VTS1214 Core Machine

2

Vibration and heat generation at the spindle are minimized with a belt-driven, detachable gearbox. Cutting capacity and safety are enhanced with large diameter bearings.

3

800 mm (31.5 inch) extra long guide span

Ram deformation is minimized with an enlarged guideway. A wide ram guide enables heavy duty cutting.

Large square cross-section

308 × 250 mm
(12.1 × 9.8 inch)
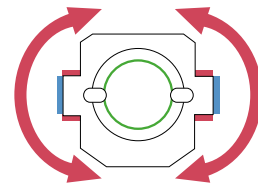
Wide ram guide corresponding to high torque

4
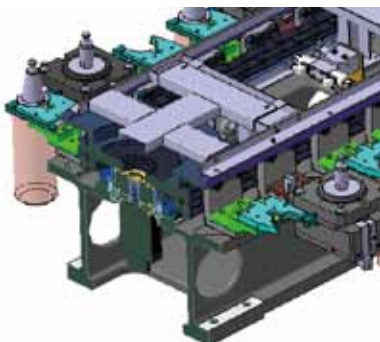
24 tool magazines are reinforced with a rigid rib structure for maximum stability. **opt.**

5

The column and spindle are rigidly supported using a grid-type, rib structure Meehanite cast. Chips can be easily discharged through the sloped top surface.

Cutting Capacity

Crossrail Fixed Positions

The 4 position step block is provided to fix the W axis position of the crossrail, and in combination with a positioning pin, maintains a high level of positioning control.
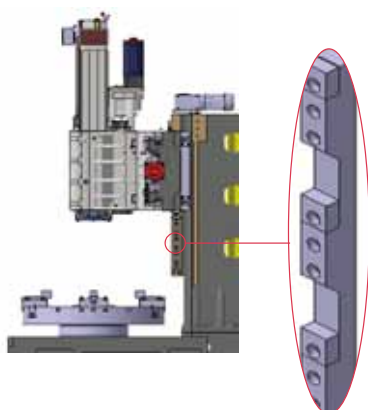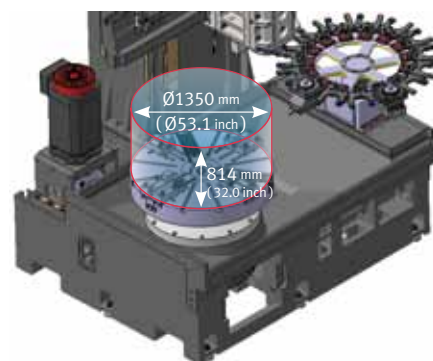

Crossrail fixed positions

4 steps = **580** mm
(22.8 inch)
(Geared motor control type)

Axis Travel

Ø1350 mm
(Ø53.1 inch)

814 mm
(32.0 inch)

Max Turning diameter	**Ø1350** mm (53.1 inch)
Hydraulic chuck	**40** " { 50 " }
Swing over bed	**1400** mm (55.1 inch)
Max. Workpiece length	**814** mm (32.0 inch)
Max. Workpiece weight	**4000** kg (8818.4 lb)

(Including chuck)   { } : Option

Z-axis	W-axis	X-axis
800 mm	**580** mm	**1450** mm
(31.5 inch)	(22.8 inch)	(57.1 inch)

ATC Magazine

Driving system	**Servo motor**
No. of tool stations	**15** { 24 } stations
Max. Tool length	**450** mm (17.7 inch) (Static tool)
	350 mm (13.8 inch) (BT50 / DIN 50 rotating tool)
Max. Tool weight	**50** Kg (110.2 lb) / tool

{ } : Option

Table Motor Power - Torque

Max. Table Motor & Torque

60 kW (80.5 Hp)
6412 N·m (4732.1 ft·lb)

Low Gear

Torque : N·m (ft·lb)   Power : kW (Hp)

6412 (4732.1)
6389 (4715.1)   10 min   10 min   60 (80.5)
              30 min
5227 (3857.5)   Cont.   30 min   55 (73.8)
                        Cont.   45 (60.3)

                                                37 (49.6)
1351 (997.0)
1110 (819.2)

80 85 90   165   250   320

Spindle Speed (r/min)

High Gear

Torque : N·m (ft·lb)   Power : kW (Hp)

                        30 min   55 (73.8)
1597 (1178.6) 30 min   Cont.   45 (60.3)
1307 (964.6)   Cont.

834 (615.5)
682 (503.3)

325 330   630

Spindle Speed (r/min)
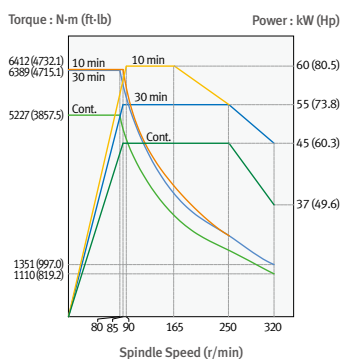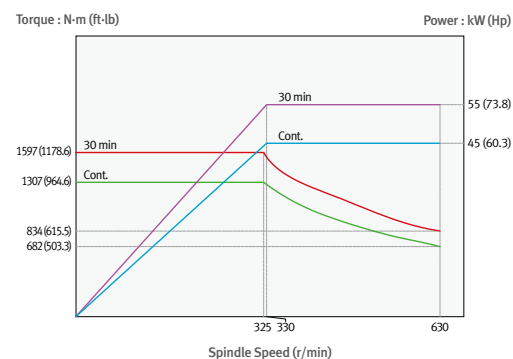
Optional Equipment and Chip Disposal

Optional Equipment

Auto door cylinder

Linear scale

Auto tool setter

Oil mist collector (except PUMA VTS1620)

Oil skimmer

Automatic pallet changer

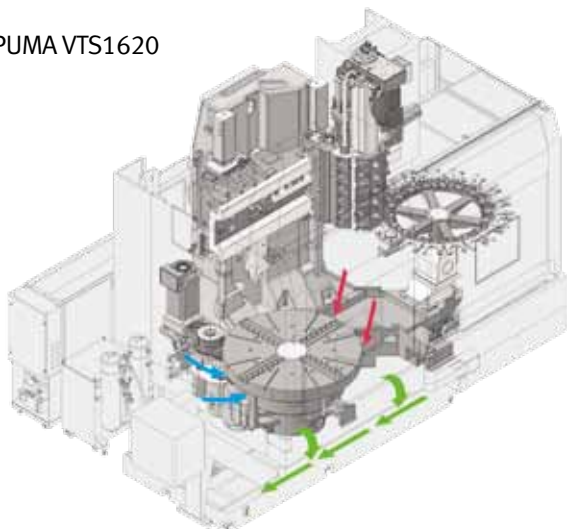## Easy Chip Discharge Design

Chips falling off to the left and right are collected in a chip pan and removed by a chip conveyor.

PUMA VTS1620

PUMA VTS1214
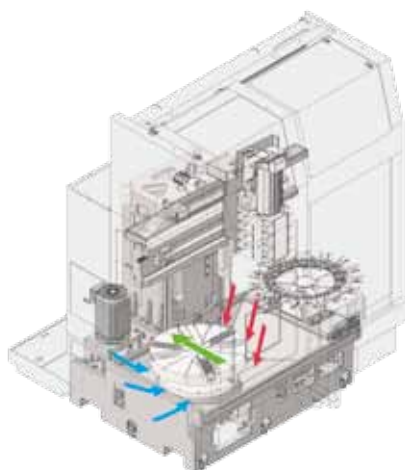
← ATC shower
← Base shower

Chip conveyor opt.

Hinge type   Scraper type

Coolant Chiller opt.

The coolant chiller lowers coolant temperature, helping to cool both the workpiece and tool during the machining operation. When using insoluble cutting oils, a coolant chiller is recommended to cool heated oil and preserve machining precision.

Coolant Chiller
Coolant Tank

Tooling System

2-axis RAM

Unit: mm (inch)

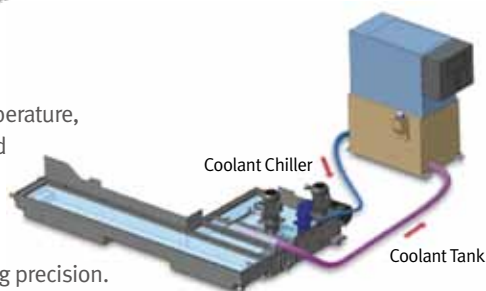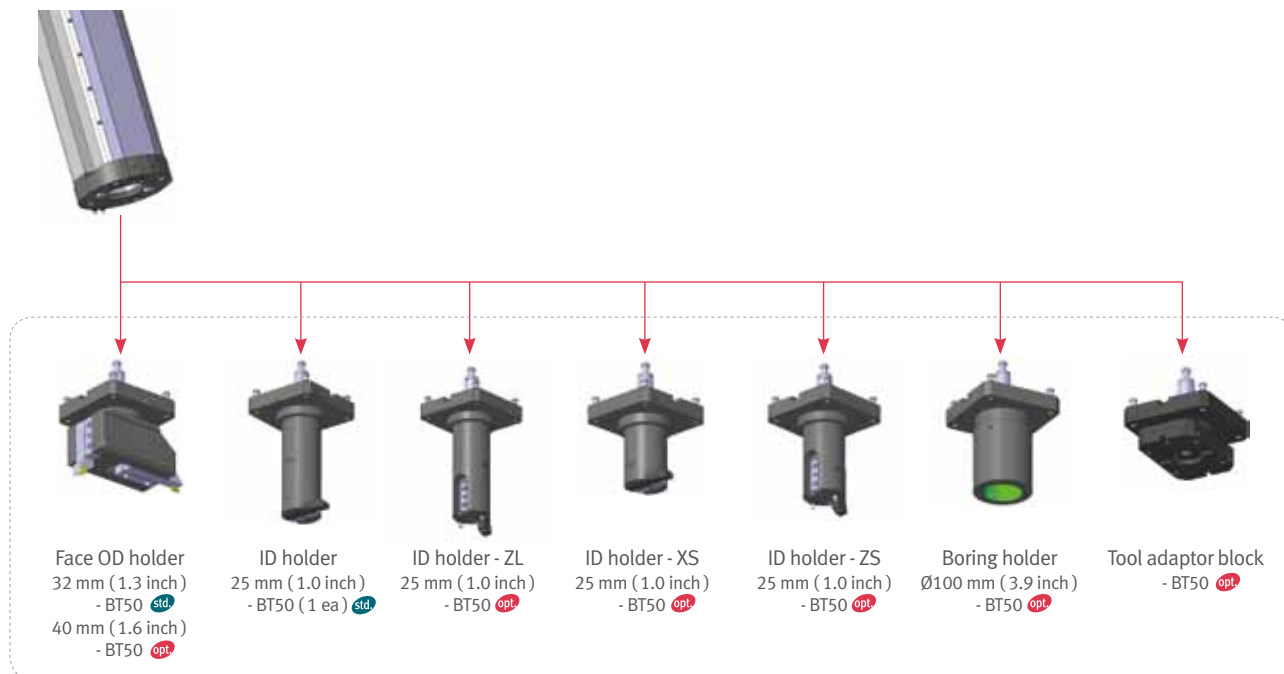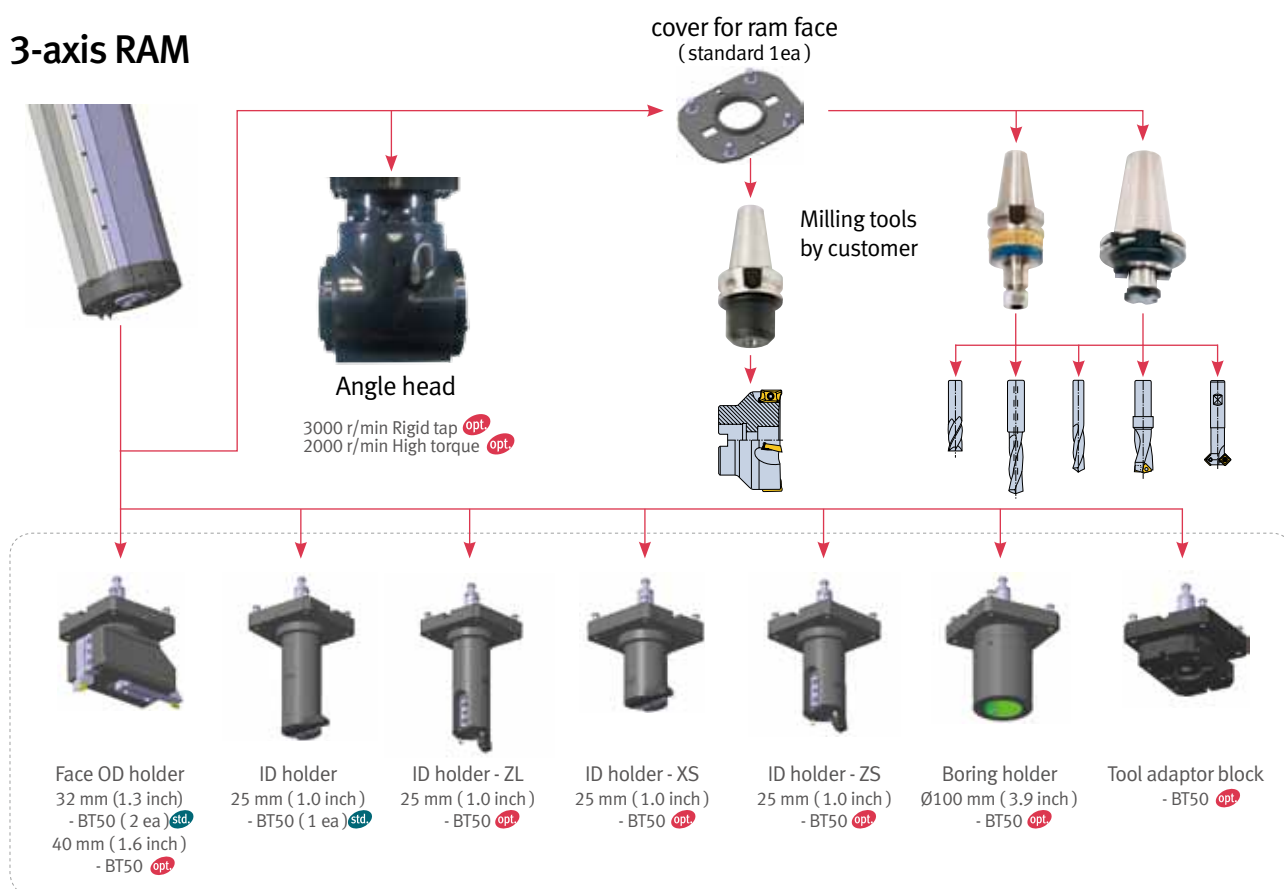| Face OD holder	ID holder	ID holder - ZL	ID holder - XS	ID holder - ZS	Boring holder	Tool adaptor block
32 mm (1.3 inch) - BT50 **std.** 40 mm (1.6 inch) - BT50 **opt.**	25 mm (1.0 inch) - BT50 (1 ea) **std.**	25 mm (1.0 inch) - BT50 **opt.**	25 mm (1.0 inch) - BT50 **opt.**	25 mm (1.0 inch) - BT50 **opt.**	Ø100 mm (3.9 inch) - BT50 **opt.**	- BT50 **opt.**

3-axis RAM

cover for ram face
(standard 1ea)

Angle head

3000 r/min Rigid tap **opt.**
2000 r/min High torque **opt.**

Milling tools
by customer

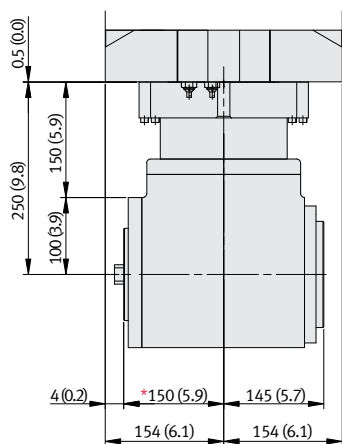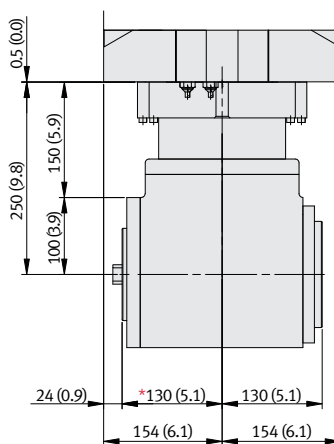| Face OD holder	ID holder	ID holder - ZL	ID holder - XS	ID holder - ZS	Boring holder	Tool adaptor block
32 mm (1.3 inch) - BT50 (2 ea) **std.** 40 mm (1.6 inch) - BT50 **opt.**	25 mm (1.0 inch) - BT50 (1 ea) **std.**	25 mm (1.0 inch) - BT50 **opt.**	25 mm (1.0 inch) - BT50 **opt.**	25 mm (1.0 inch) - BT50 **opt.**	Ø100 mm (3.9 inch) - BT50 **opt.**	- BT50 **opt.**

Tool Holder Dimentions
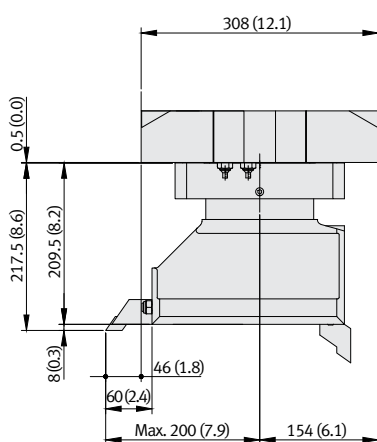
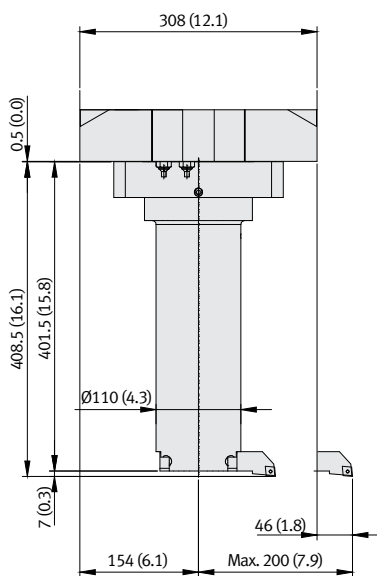Unit: mm (inch)

Angle head **opt.**

1:1 Rigid tap

3:2 High torque

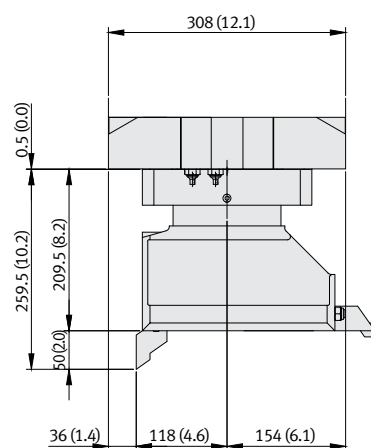* If the magazine is attached, tools are need to separate.

OD holder

ID holder

Face holder

Easy CNC Set-up and EOP

Easy Set-up

Operating console

1. **Doosan-Fanuc i series**
2. **10.4" color TFT LCD Monitor**
   Various alarm messages indicating errors from the machine and controller will be displayed on the 10.4" LCD screen, enhancing the operator's convenience.
3. **PCMCIA Card**
4. **USB Port**
   (only DOOSAN Fanuc i seres)
5. **Swivel-type Operating Consol**
6. **Ethernet function (embedded)**

ATC Guidance

ATC guidance main screen display

Guidance screen for ATC tool change
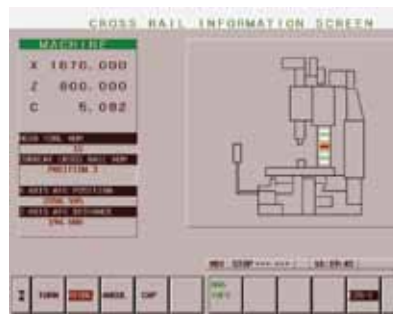
Tool holder information screen

Cross Rail Manual Fine Feeding

Fine feeding for the cross rail service and adjustment

Select jog mode for fine feeding of cross rail

JOG mode

Working Range

PUMA VTS1620 / VTS1620M

Unit: mm (inch)

auto tool setter included

auto tool setter excluded

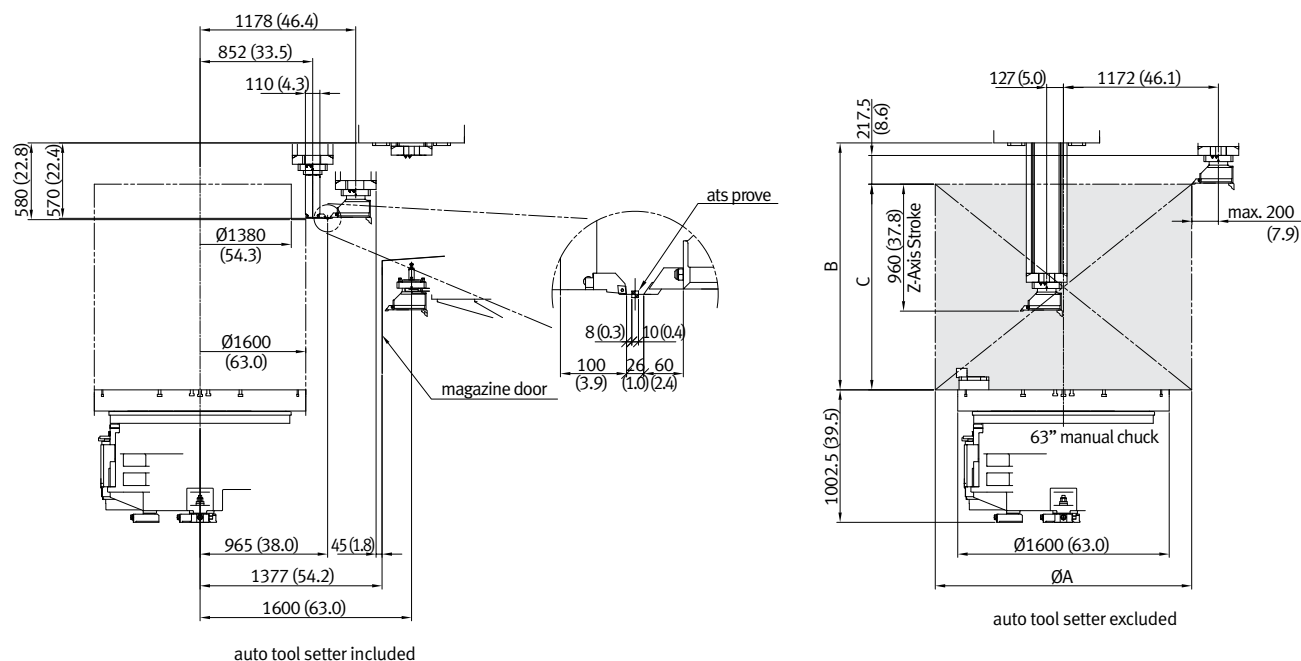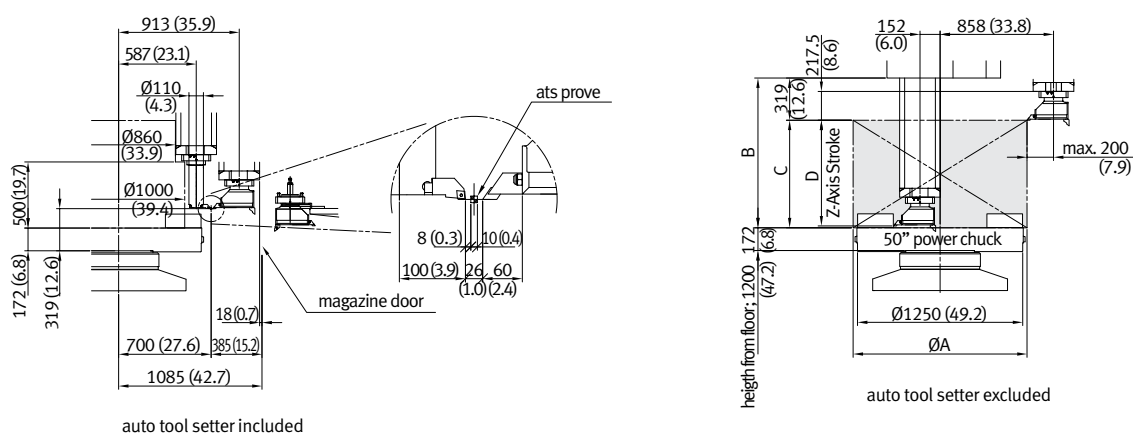|		W-Axis 1 Step ; 0		W-Axis 2 Step ; 170		W-Axis 3 Step ; 370		W-Axis 4 Step ; 570		W-Axis 5 Step ; 770	
	A	B	C	B	C	B	C	B	C	B	C
Face Tool Holder	2000 (78.7)	998 (39.3)	746 (29.4)	1168 (46.0)	916 (36.1)	1468 (57.8)	1116 (43.9)	1668 (65.7)	1316 (51.8)	1868 (73.5)	1516 (59.7)
OD Tool Holder	1940 (76.4)		786 (30.9)		956 (37.6)		1156 (45.5)		1356 (53.4)		1556 (61.3)
X-Long ID Tool Holder	2000 (78.7)		597 (23.5)		767 (30.2)		967 (38.1)		1167 (45.9)		1367 (53.8)

PUMA VTS1214 / VTS1214M

auto tool setter included

auto tool setter excluded

		W-Axis 1 Step ; 0 mm			W-Axis 2 Step ; 130 mm (5.1 inch)			W-Axis 3 Step ; 280 mm (11.0 inch)			W-Axis 4 Step ; 430 mm (16.9 inch)			W-Axis 5 Step ; 580 mm (22.8 inch)		
	A	B	C	D	B	C	D	B	C	D	B	C	D	B	C	D
Face Tool Holder	1350 (53.1)	553 (21.8)	192 (7.6)	370 (14.6)	683 (26.9)	322 (12.7)	500 (19.7)	833 (32.8)	472 (18.6)	650 (25.6)	983 (38.7)	622 (24.5)	800 (31.5)	1133 (44.6)	772 (30.4)	800 (31.5)
OD Tool Holder	1316 (51.8)		234 (9.2)			364 (14.3)			514 (20.2)			664 (26.1)			814 (32.0)	
X-Long ID Tool Holder	1350 (53.1)		43 (1.7)			173 (6.8)			323 (12.7)			473 (18.6)			623 (24.5)	

External Dimension

PUMA VTS1620 / VTS1620M

Unit: mm (inch)

Top View

Front View

Side View

External Dimension
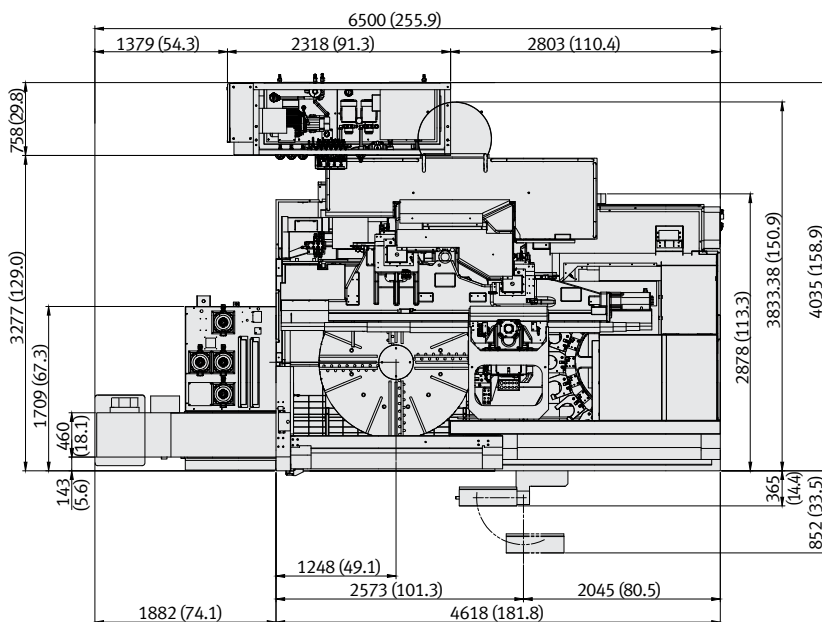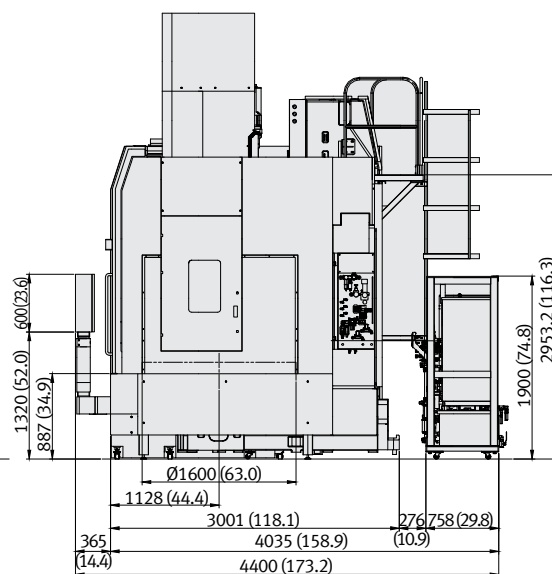
PUMA VTS1214 / VTS1214M

Unit: mm (inch)
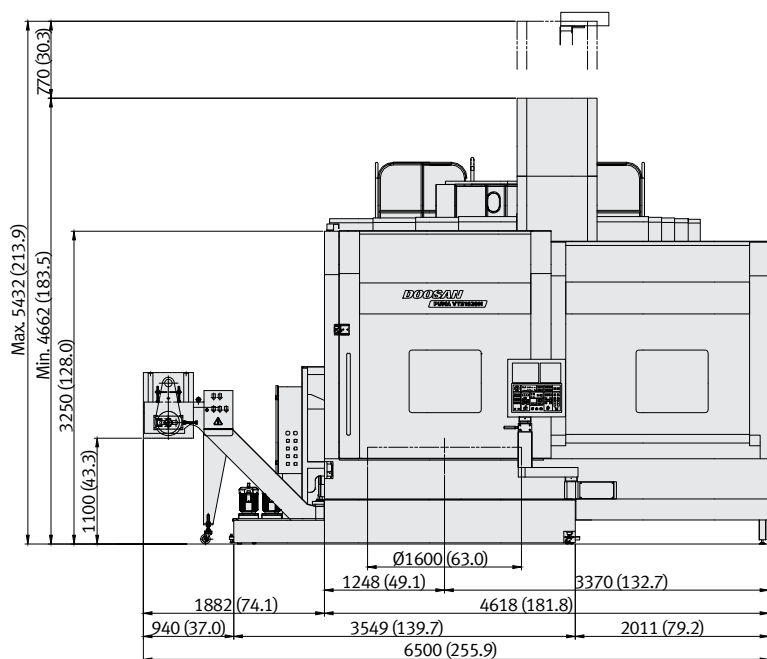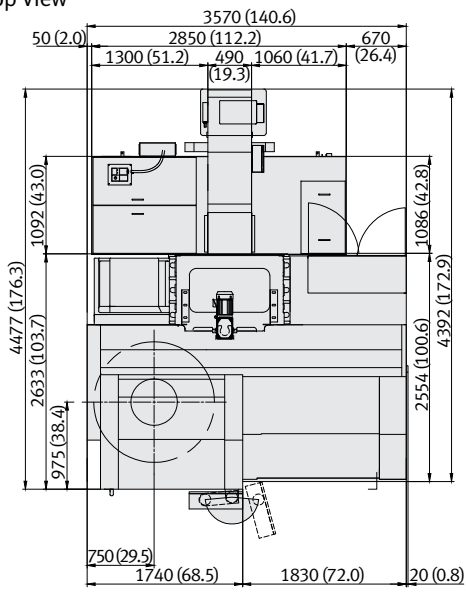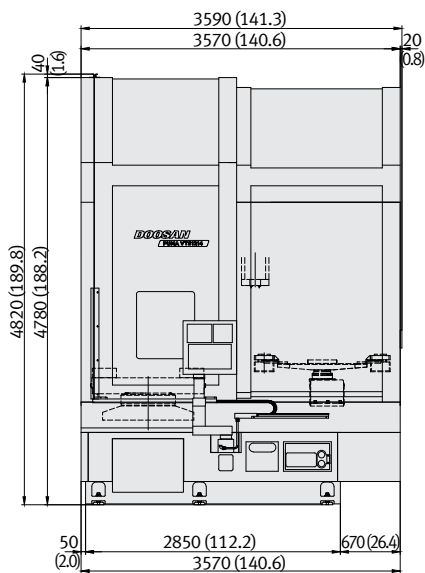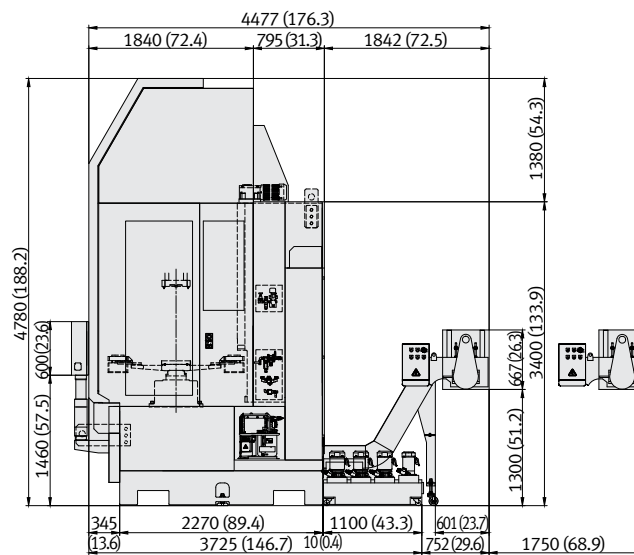
Top View

Front View

Side View

Machine Specifications

	Features	Unit	PUMA VTS1620	PUMA VTS1620M	PUMA VTS1214	PUMA VTS1214M*
Capacity	Swing over bed	mm (inch)	2000 (78.7)		1400 (55.1)	
	Max. Turning diameter	mm (inch)	2000 (78.7)		1350 (53.1)	
	Max. Turning height	mm (inch)	1556 (61.3)		814 (32.0)	
	Max. Turning weight	kg (lb)	10000 (22045.9)		4000 (8818.4)	
Travels	Travel distance — X-axis (To left from table center)	mm (inch)	127 (5.0)		152 (6.0)	
	(To right from table center)	mm (inch)	1600 (63.0)		1298 (51.1)	
	Z-axis	mm (inch)	960 (37.8)		800 (31.5)	
	C-axis	deg	-	360	-	360
	W-axis	mm (inch)	770 (30.3)		580 (22.8)	
Feedrates	Rapid Traverse Rate — X-axis	m/min	12		12	
	Z-axis	m/min	12		12	
	C-axis	deg/min	-	900	-	900
Ram	Ram size	mm (inch)	308 × 250 (12.1 × 9.8)		308 × 250 (12.1 × 9.8)	
	Min. through hole inside diameter	mm (inch)	320 (12.6)		320 (12.6)	
Table	Max. Spindle speed	r/min	250		630	
	Table size		1600 (63")		1000 (40")	
	Spindle bearing diameter	mm (inch)	685.8 (27.0)		240 (9.4)	
Rotary Tool	Max. rotary tool spindle torque	ea	-	262 {687}	-	262 {687}
	Max. roatry tool spindle speed	mm (inch)	-	3000 {2000} (118.1 {78.7})	-	3000 {2000} (118.1 {78.7})
	Rotary tool bearing diameter	mm (inch)	-	100 (3.9)	-	100 (3.9)
Tool magazine	Tool storage capa.	stations	18 {24}		15 {24}	
	Tool size — Face OD		32 × 32		32 × 32	
	ID		25 × 25		25 × 25	
Motors	Table motor power	kW (Hp)	45 (60.3) / 37.5 (50.3) (30min/cont.) {60 (80.5) / 45 (60.3) (10min/cont.)}		60 (80.5) / 55 (73.8) / 45 (60.3) (10min/30min/cont.)	
	Rotary tool motor power	kW (Hp)	-	18.5 (24.8) / 15 (20.1) (30min/cont.) {15 (20.1) / 11 (14.8) (30min/cont.)}	-	18.5 (24.8) / 15 (20.1) (30min/cont.) {15 (20.1) / 11 (14.8) (30min/cont.)}
Power source	Electric power supply (rated capacity)	kVA	90	110	90	110
Machine Dimensions	Height	mm (inch)	5639 (222.0)		4820 (189.8)	
	Width	mm (inch)	5200 × 3451 (204.7 × 135.9)		3590 × 3725 (141.3 × 146.7)	
	Weight	kg (lb)	30000 (66137.7)	31000 (68342.3)	25500 (56217.0)	26000 (57319.3)
NC CONTROL			DOOSAN Fanuc i series / Fanuc 32i			

* For machining accuracy of X / C axes contouring, please contact Doosan.

{ } : Option

Standard Feature

- 3 jaws hydraulic chuck (VTS1214/M)
- 4 jaws manual chuck (VTS1620/M)
- ATC shower coolant
- Bed shower coolant
- Column ladder and rail (VTS1620/M)
- Crossrail positioning unit
- Hydraulic unit
- Leveling bolts and plates
- Lubricant supplier
- Machine installation parts
- M code program (Drive vertical crossrail)
- Ram air blast
- Ram shower coolant
- Splash guard
- Standard tool holder
- Table cooling system (VTS1620/M)
- Tool clamp air seating checker

Optional Feature

- 50" hydraulic chuck (VTS1214/M)
- 50" combination chuck (VTS1214/M)
- 63" combination chuck (VTS1620)
- 70 bar coolant
- Air conditioner
- Automatic front door
- Auto tool setter
- Chip bucket, chip conveyor
- Coolant gun
- Linear scale (X, Z-axis)
- Line filter for coolant
- Mist collector (VTS1214/M)
- Oil Skimmer (belt type)
- Parts probe
- Signal tower
- Special chuck

- The specifications and information above-mentioned may be changed without prior notice.
- For more details, please contact Doosan

NC Unit Specifications

DOOSAN Fanuc i series

Standard Specifications

AXES CONTROL
- Controlled axes   X, Z, C (X, Z, C, E - VT)
- Simultaneously controllable axes   3 axes
- Axis control by PMC
- Backlash compensation 0 ~ ± 9999 pulses
- Backlash compensation for each rapid traverse and cutting feed
- Chamfering on / off
- Cs contouring control
- HRV2 control
- Inch / Metric conversion
- Increment system 1/10
                     0.0001 / 0.00001 mm/inch
- Interlock   All axes / each axis
- Least input command 0.001 / 0.0001 mm/inch
- Machine lock   All axes / each axis
- Overtravel
- Position switch
- Stored stroke check 1
- Stored stroke check 2, 3

OPERATION
- Automatic operation (memory)
- Buffer register
- DNC operation (Reader / puncher interface is required)
- Handle incremental feed   X1, X10, X100
- JOG feed
- Manual handle feed   1 unit
- Refernce position setting without dog
- Wrong operation prevention

INTERPOLATION FUNCTIONS
- 1st. reference position return   Manual, G28
- 2nd. reference position return   G30
- 3rd / 4th. reference position return   G30
- Circular interpolation   G02
- Continuous threading
- Dwell (per sec)   G04
- Linear interpolation   G01

- Polar coordinate interpolation
- Positioning   G00
- Reference position return check   G27
- Thread cutting / Synchronous cutting

FEED FUNCTION
- Automatic acceleration / deceleration
- Cutting feedrate clamp
- Feedrate override (10% unit)   0 - 200 %
- Jog feed override (10% unit)   0 - 2000 mm/min
- Override cancel
- Rapid traverse override   F0,25, 100 %
- Tangential speed constant control

AUXILIARY / SPINDLE SPEED FUNCTION
- Constant surface speed control
- High speed M / S / T interface
- Spindle orientation

PROGRAM INPUT
- Absolute / incremental programming
- Addition of custom macro common variables
- Automatic coordinate system setting
- Canned cycle for drilling / Turning
- Circular interpolation by R programming
- Coordinate system setting   G50
- Custom macro
- Decimal point programming/
- Diameter/radius programming (X axis)
- Direct drawing dimension programming
- Direct of coordinate system shift
- G code system A / B / C
- Input unit 10 time multiply
- Maximum program dimension   ±9 digit
- Multiple repetitive canned cycle G70 - G76
- Multiple repetitive canned cycle II
- Optional block skip   1 piece
- Optional block skip (Soft operator's panel)
                                         9 pieces
- Plane selection   G17, G18, G19
- Pocket calculator type decimal point programming

- Program number   O4 digit
- Program stop / end (M00, M01 / M02, M30)
- Programmable data input   G10
- SUB program call   4 folds nested
- Tape code : ISO / EIA auto recognition
                     EIA RS422 / ISO840
- Tape format for FANUC Series10/11
- Work coordinate system   G52 - G59

TOOL FUNCTION / TOOL COMPENSATION
- Automatic tool offset
- Direct input of offset value measured B
- Extended tool life management
- T - code function   T2 +2 digits
- Tool geometry / wear compensation
- Tool life management
- Tool nose radius compensation
- Tool offset   G43, G44, G49
- Tool offset pairs   64 pairs

EDITING OPERATION
- Extended part program editing
- Number of registered programs   400 ea
- Part program storage length   1280 (512KB) m
- Program protect

SETTING AND DISPLAY
- Actual cutting feedrate display
- Alarm history display
- Directory display and punch for each group
- Display of spindle speed and T code at all screens
- Multi-language display
- Operating monitor screen
- Parameter setting and display
- Program name display   31 characters
- Run hours / parts count display
- Self-diagnosis function
- Spindle setting screen
- Soft operator's panel
- Tool path graphic display

OTHERS
- Cycle start and lamp

- Display unit
   10.4" Color TFT LCD (except Lynx220M/300M)
        8.4" Color LCD : Lynx220M/300M
- Feed hold and lamp
- NC and servo ready
- PCMCIA port in the front of LCD display unit
- PMC system   0iD-PMC
- Reset / rewind

OPERATION GUIDANCE FUNCTION
- eZ Guide i   Only 10.4 Color LCD
- Manual Guide 0i   Only 8.4 Color LCD

INTERFACE FUNCTION
- Ethernet function   Embedded ethernet

Optional Specifications

AXIS CONTROL
- Controlled axes expansion(total)   Max. 4 axes
- Simultaneous controlled axes expansion(total)
                                         Max. 4 axes

OTHERS
- 10.4" Color TFT LCD (Only Lynx220M/300M)
- Advanced preview control
- Dynamic graphic display   Only Lynx-series
- Fast ethernet / Data server
- Helical interpolation
- High speed skip function
- Manual handle interruption
- Manual handle feed   2 units
- Number of tool offset   99 pairs

ROBOT INTERFACE
- Robot interface with PMC I/O module
   (Hardware between PMC I/O mudules)
- Robot interface with PROFIBUS-DP

TOOL FUNCTION / TOOL COMPENSATION
- Tool Load Monitoring system

FANUC 32i

Standard Specifications

AXES CONTROL
- Controlled axes   X, Z
- Simultaneous controlled axes   2 axes
- Axis control by PMC
- Backlash compensation 0 ~ ± 9999 pulses
- Backlash compensation for each rapid traverse and cutting feed
- Controlled path   1 path
- HRV2 control
- Inch / Metric conversion
- Interlock   All axes / each axis
- Least input command 0.001 / 0.0001 mm/inch
- Mirror image
- Servo off
- Stored stroke check 1
- Torque control
- Unexpected disturbance torque detection function

OPERATION
- Automatic operation (memory)
- Buffer register
- DNC Operation with Memory card
- Handle incremental feed   X1, X10, X100
- Program restart

INTERPOLATION FUNCTIONS
- 1st. Reference position return Manual, G28
- 2nd. reference position return   G30
- Circular interpolation   G02
- Continuous threading
- Dwell (per sec)   G04
- Linear interpolation   G01
- Positioning   G00
- Reference position return check   G27
- Thread cutting / Synchronous cutting

FEED FUNCTION
- Automatic acceleration / deceleration
- Cutting feedrate clamp
- Feed per revolution
- Feedrate override (10% unit)   0 - 200 %
- Jog feed override (10% unit)   0 - 2000 mm/min

- Override cancel
- Rapid traverse override   F0, 25, 100 %
- Tangential speed constant control

AUXILIARY / SPINDLE SPEED FUNCTION
- Constant surface speed control
- M - code function   M3 digits
- Spindle orientation

PROGRAM INPUT
- Absolute / incremental programming
- Automatic coordinate system setting
- Canned cycle for drilling / Turning
- Canned cycle
- Circular interpolation by R programming
- Coordinate system setting   G50
- Coordinate system shift
- Custom macro
- Decimal point programming/
   Pocket calculator type decimal point
   programming
- Diameter/radius programming (X axis)
- Direct drawing dimension programming
- G code system A
- G code system B / C
- Input unit 10 time multiply
- Macro executor
- Maximum program dimension   ±9 digit
- Multiple repetitive canned cycle   G70 - G76
- Multiple repetitive canned cycle II
- Optional block skip   9 pieces
- Plane selection   G17, G18, G19
- Program file name   32 characters
- Programmable data input   G10
- Sequence number   N8 digit
- SUB program call   10 folds nested

TOOL FUNCTION / TOOL COMPENSATION
- Automatic tool offset
- Direct input of offset value measured B
- T - code function   T2 + 2 digits
- Tool life management
- Tool nose radius compensation

- Tool offset   G43, G44, G49
- Tool offset pairs   ±6 digits : 64 pairs
- Tool offset value counter input

EDITING OPERATION
- Extended part program editing
- Number of registered programs   500 ea
- Part program editing
- Part program storage length   640 (256 KB) m

SETTING AND DISPLAY
- Actual cutting feedrate display
- Alarm history display
- Display of spindle speed and T code at all screens
- Operation history display
- Operating monitor screen
- Parameter setting and display
- Periodic maintenance screen
- Program comment display   31 characters
- Run hours / part count display
- Self-diagnosis function
- Servo waveform display
- Spindle setting screen

OTHERS
- Cycle start and lamp
- Display unit   10.4" Color TFT LCD
- Feed hold and lamp
- NC and servo ready
- PMC system   32i-PMC
- Reset / rewind

OPERATION GUIDANCE FUNCTION
- EZ Guidei (Conversational Programming Solution)

INTERFACE FUNCTION
- Ethernet function   Embedded ethernet
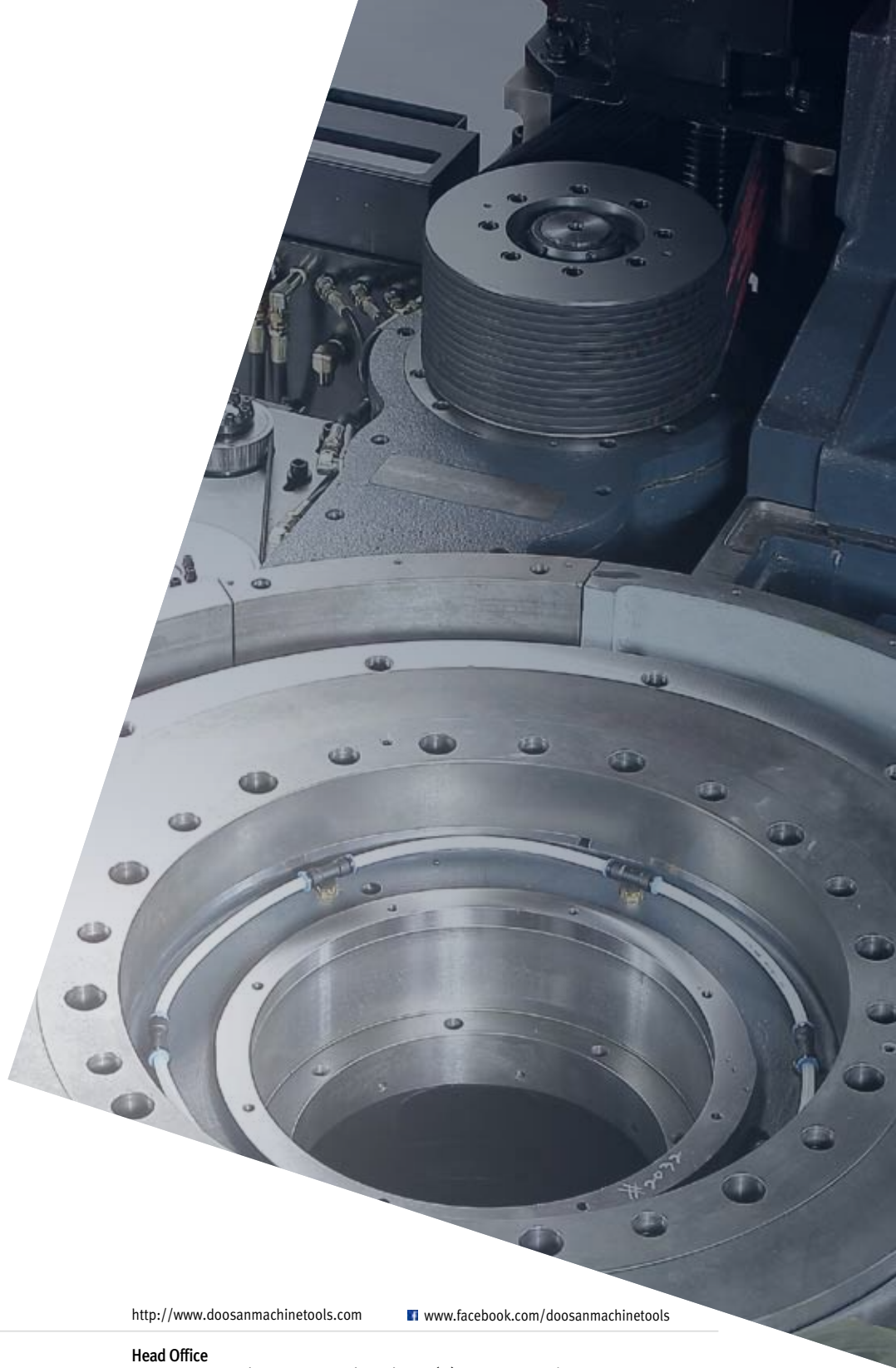
Optional Specifications

AXIS CONTROL
- Stored pitch error compensation
- Stored stroke 2 and 3
- Stroke limit check before move

OPERATION
- Active block cancel
- DNC operation (Reader / puncher interface is required)
- Manual handle interruption
- Manual intervention and return
- Reference position shift

INTERPOLATION FUNCTIONS
- 3rd / 4th reference point reurn
- Circular threading
- Multi step skip

PROGRAM INPUT
- Addition of workpiece coordinate system pair
                                         48 pairs
- Additional macro variables   #100 ~ #199,
                                    #500 ~ #999
- Automatic corner override
- Chamfering on/off
- Interruption type custom macro
- Optional block skip (Soft operator's panel)   9 pieces
- Work coordinate system preset

TOOL FUNCTION / TOOL COMPENSATION
- Addition of tool pairs for tool life management
                                         128 pairs
- Tool Load Monitoring system
- Tool offset pairs 99 / 200 / 400 / 999 pairs

EDITING OPERATION
- Number of registered programs& Part
   program storage length
                     1280M (512KB)_1000 ea
                     2560M (1MB)_1000 ea
                     5120M (2MB)_1000 ea

DATA INPUT/OUTPUT
- DNC1 control
- External data input
- Fast ethernet / Data server
- Remote buffer

OTHERS
- High speed skip function
- Manual handle interruption
- Stored pitch error compensation

Doosan Machine Tools

Optimal Solutions for the Future